

المراجعة رقم (1)

اختبار شهر مارس



Test 1 On the Second Month

Choose the correct answer (1 : 8) :

1 What is the value of the action potential that resulted from strong stimulus compared to the stimulus that has lower strength, if both of them are sufficient for stimulation ?

ⓐ Double. ⓑ Higher. ⓒ Lower. ⓓ Equal.

2 Which of the following represents the change occurred in the environment that makes the nervous system respond with a certain way ?

ⓐ Stimulus. ⓑ Response. ⓒ Receptor. ⓓ Sensation.

3 Which of the following represents the role of Schwann cells in the transmission of nerve impulse ?

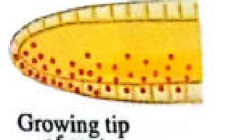
ⓐ They nourish the axons of neurons.
ⓑ They decrease the speed of nerve impulse.
ⓒ They increase the speed of nerve impulse.
ⓓ They protect the nerve cell.

4 According to the values of the ions illustrated in the following table, what is the state of this cell ?

ⓐ Rest state.
ⓑ The end of the depolarization state.
ⓒ The beginning of repolarization state.
ⓓ Increasing the polarization.

	Inside the neuron	Outside the neuron
Na^+	15 mM	145 mM
K^+	150 mM	5 mM

5 The following figure illustrates the accumulation of auxins in the growing tip for each of the root and stem in a horizontal position. What is the expected result in both states ?


Growing tip of root

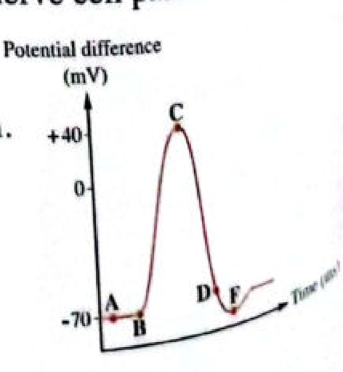

Growing tip of stem

ⓐ Inhibiting the elongation of cells on the two sides which are free from auxins.
ⓑ Activating the elongation of cells on the two sides which are free from auxins.
ⓒ The curvature of each of the two tips in the same direction.
ⓓ The curvature of each of the two tips in an opposite direction to the other.

6 The following graph illustrates the stages through which the nerve cell passes, when it is exposed to stimulation, where :

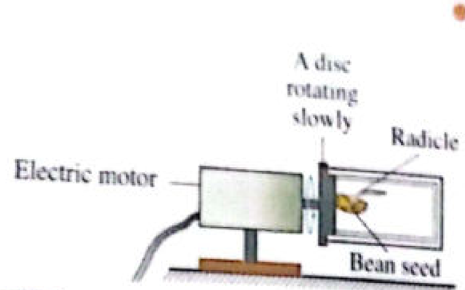
- **(AB) :** polarization stage. - **(BC) :** depolarization stage.
- **(CD) :** repolarization stage. - **(DF) :** increasing polarization.

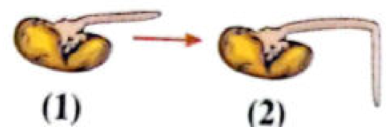
In which of the following stages the positive ions exceed the negative ions inside the nerve cell ?



ⓐ The beginning of the depolarization stage and the end of the repolarization stage.
ⓑ The end of the depolarization stage and the beginning of the repolarization stage.
ⓒ The beginning of depolarization stage and increasing the polarization stage.
ⓓ The polarization stage and the beginning of repolarization stage.

7 The opposite figure illustrates an apparatus used to prove the tropism, what is the procedure through which the radicle of seed no. (1) grows, in order to be as figure no. (2) on fixing the seed as in this apparatus ?





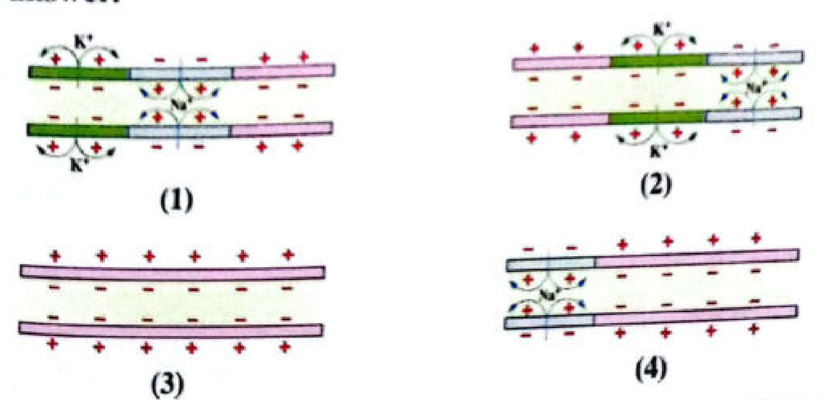
ⓐ Rotating the seed for two days and fixing it for the next two days.
ⓑ Fixing the seed for two days and rotating it for the next two days.
ⓒ Rotating the seed for four days.
ⓓ Non-rotating the seed for four days.

8 Which of the following organelles characterize(s) the glial cells from the nerve cells ?

ⓐ Mitochondria. ⓑ Nissl's granules. ⓒ Centrosome. ⓓ Nucleus.

Answer the following questions (9 & 10) :

9 **Arrange** the following stages of the nerve impulse, starting from its occurrence at the rest state, then **mention** the direction of the nerve impulse transmission. **Explain your answer.**

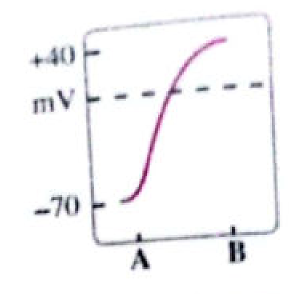


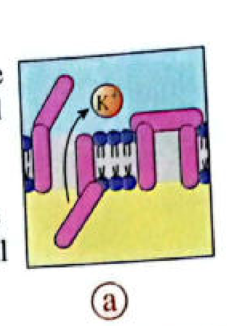
10 The nervous tissue is supported by nervous components and other non-nervous components. **Prove this with an example for the two components.**

Test 2

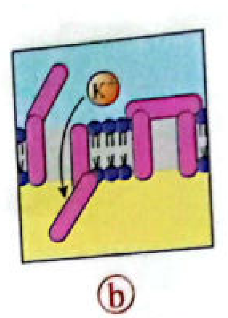
Choose the correct answer (1 : 8) :

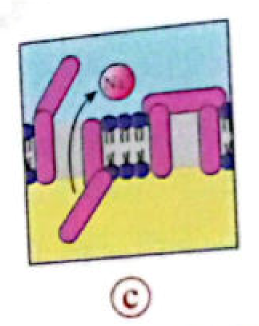
1 Which of the following figures represents the flow of a larger amount of ions during the period (A : B) of the nerve impulse transmission in the opposite graph ?

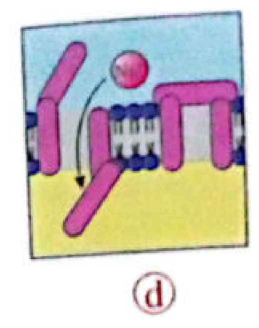




ⓐ

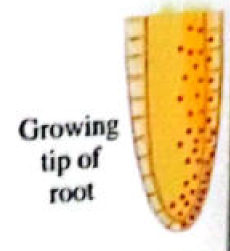

ⓑ

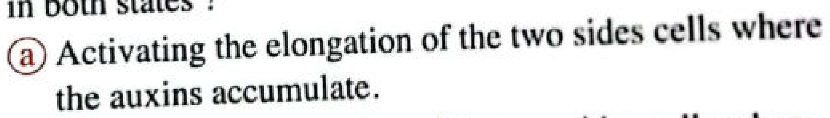

ⓒ

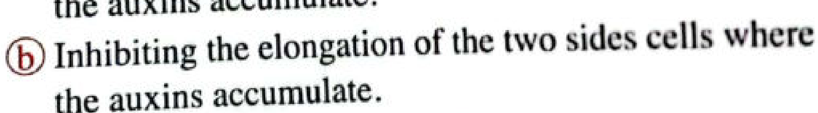

ⓓ

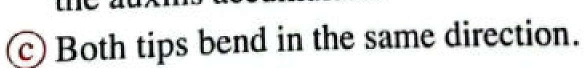
2 The opposite figure illustrates the accumulation of auxins in a side of the growing tip for each of the stem and root in a vertical position, what is the expected result in both states ?






ⓐ Activating the elongation of the two sides cells where the auxins accumulate.


ⓑ Inhibiting the elongation of the two sides cells where the auxins accumulate.


ⓒ Both tips bend in the same direction.

ⓓ Both tips bend in two opposite directions.

3 Which of the following organelles characterize(s) the nerve cell from the glial cells ?

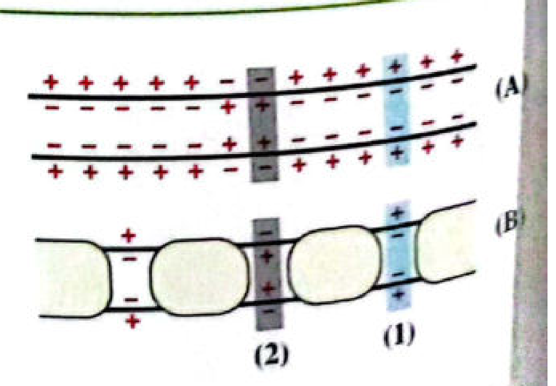
ⓐ Centrosome.

ⓑ Nucleus.

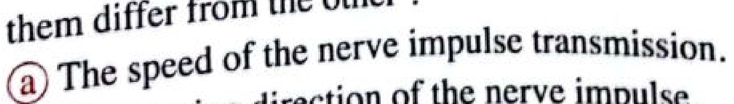
ⓒ Mitochondria.

ⓓ Nissl's granules.

4 The opposite figure illustrates two parts of two neuron's axons (A) and (B) having the same length, in which of the following does each of them differ from the other ?



ⓐ The speed of the nerve impulse transmission.


ⓑ The passing direction of the nerve impulse.

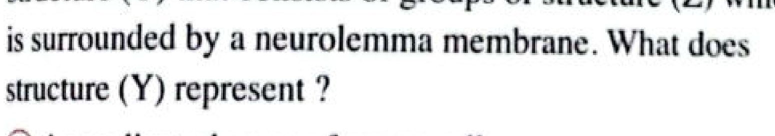
ⓒ The potential difference at (1).

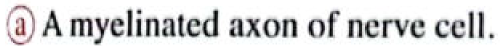
ⓓ The action potential at (2).

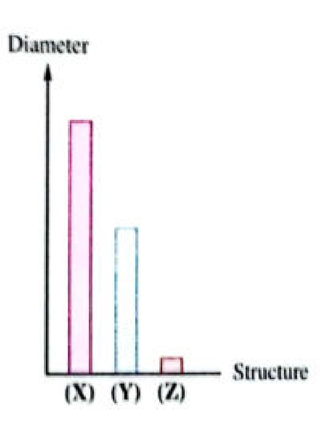
5 Which of the following is considered a reason for the non-response of a nerve fiber for one of the sensory nerve stimuli during the rest state ?

ⓐ The shortage of ATP molecules.
ⓑ The weakness of the stimulus strength.
ⓒ The absence of Ranvier's nodes.
ⓓ The absence of Nissl's granules.

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6 In the opposite graph, structure (X) consists of groups of structure (Y) that consists of groups of structure (Z) which is surrounded by a neurolemma membrane. What does structure (Y) represent ?


ⓐ A myelinated axon of nerve cell.
ⓑ A non-myelinated axon of nerve cell.
ⓒ Nerve bundle.
ⓓ Nerve.



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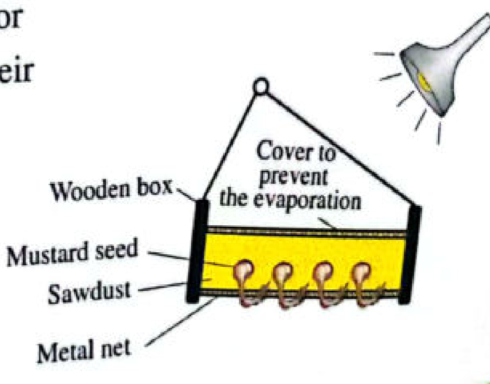
7 In which of the following the motor nerve cells and the sensory nerve cells participate in the right arm ?

ⓐ The direction of the nerve impulse with respect to the arm.
ⓑ The connection with the responding organ.
ⓒ The connection with the receptor organ.
ⓓ The connection with the central nervous system.

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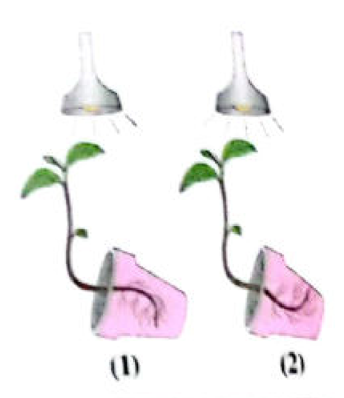
8 In the opposite figure, what is your explanation for taking the roots the illustrated direction during their growth after several days of the irrigation ?

ⓐ The root is positive geotropic.
ⓑ The root is positive hydrotropic.
ⓒ The root is negative phototropic.
ⓓ The tropism has no role in this state.



Answer the following questions (9 & 10) :

9 **Study the opposite figures, then determine** the scientific mistake that is found in the figure. **Explain your answer.**



10 The role of mitochondria that are present in the nerve cell body increases in one of the nerve impulse stages, **determine** this stage and the role of mitochondria in it.



كيفية طباعة صفحات معينة من ملف معين

مثلا ازاى نطبع الصفحات من صفحة 4 الى صفحة 9



خطوة 1

خطوة 2
اختيار اسم الطابعة بتاعتك

خطوة 3
كتابة الصفحات المراد طباعتها
نكتب رقم 4 ثم نكتب الشرطة دي ـ ثم نكتب 9

خطوة 4
اختيار نوع الورق

خطوة 5
اختيار A4

خطوة 6

المراجعة رقم (2)

اختبار شهر مارس





Sensation in Man

(Nervous Tissue)

Nervous system

• The nervous system cooperates with the endocrine system to:

-Control all the functions and activities of the human body systems and coordinate their actions accurately.

- Receive the information of either external or internal stimuli through the receptor systems, then give the proper response to them.

This is for:

• Keeping the human body in a continuous and direct communication with its external and internal environment.

• Keeping the internal environment of the body ideal, constant and balanced (homeostasis).

•The nervous system reaches the highest degree of development in vertebrates, especially in man.

The nervous system is divided into:

1-Central nervous system (CNS)

2-Peripheral nervous system (PNS):

Includes Autonomic nervous system divided into

A-Sympathetic nervous system

B-Parasympathetic nervous system

➢ The building unit of the nervous system which is "the nerve cell".

Nerve cell (Neuron)

• Nerve cell is small in size like the other cells and can't be recognized by the naked eve.

Nerve cell consists of:-

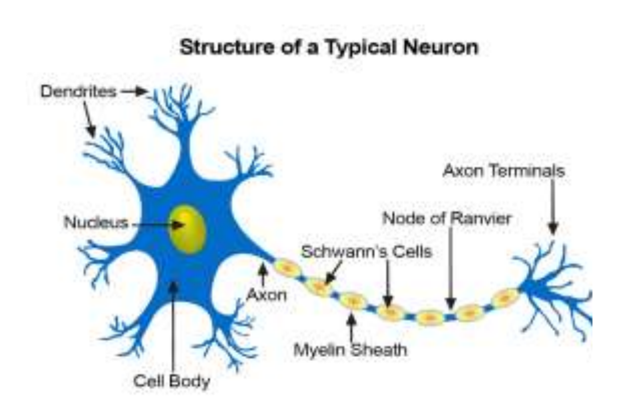
1- Nerve cell body

• Nerve cell body contains:

Rounded nucleus.

Cytoplasm surrounds the nucleus and known as

Neuroplasm which contains



Nissil's granules

• All cell organelles, such as mitochondria and Golgi bodies, except the centrosome or centrioles. So, neurons can't divide.

• Minute filaments called neurofilaments.

• Minute granules called Nissil's granules.

Nissil's granules:

They are minute granules that are unique for (Found in) nerve cells only and considered to

Be the stored food for the nerve cell which is consumed during its activity.

2-Nerve cell processes

There are two types of them in the nerve cell, which are:

- *Dendrites*

Many short processes arise from the nerve cell body to increase the nervous surface area that receives the nerve impulses.

• Most of the nerve impulses enter the nerve cell body through the dendrites, and some of them enter through the cell body.

- *B- Axon (Nerve fiber)*

• It is a long cytoplasmic extension of the cell body which may reach more than a meter in length.

•It ends with a group of branches called "terminal arborizations".

• It is surrounded by two sheaths, which are:

1 -Myelin sheath

- A white lipid substance called "Myelin" which is present in some nerve cells and secreted by special cells called "Schwann cells".

It is not surrounding the axon continuously, but it is interrupted at certain points by a number of nodes called "Ranviers nodes".

2 -Neurolemma

- A thin layer that covers the myelin sheath from outside.

- **Function of the axon**

It transfers the nerve impulses from the body of nerve cell to the synapse, and it was found that the myelinated axons (covered by the myelin sheath) transfer these nerve impulses much more rapidly than the non-myelinated nerve fibers (axons), this is because the myelin

sheath is considered an insulating material, making the nerve impulse move through Ranvier's nodes only.

Note

The nerve impulse is always propagating and conducting in one direction only, as the nerve impulses enter the nerve cell body through the dendrites, then to the axon, while the terminal arborizations transmit these impulses away from the cell body through the synapsa

- **Types of nerve cells**

• According to the function, nerve cells are classified into three main types, which are Transmit the nerve impulses from the receptor organs to the central nervous system.

1- Sensory neurons:

Transmit the nerve impulses from the receptor to the central nervous system

2- Motor neurons:

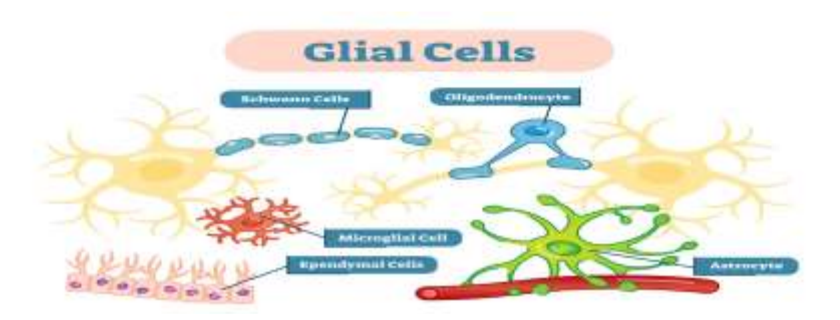
Transmit the nerve impulses from central nervous system to the effector (responding) organs, such as muscles and glands

3-Connector"Interneurons":

Connect the sensory neurons with the motor neurons (act as a link between them).

• In addition to the nerve cell's bodies and their processes, there is another type of cells in the nervous tissue which is known as "neuroglia".

Neuroglia (Glial cells)



•A type of cells that are found among the components of nervous tissue which are characterized by their ability to divide

• The main functions of neuroglia:

1- Support the neurons, where they act as a connective tissue (Supportive).

2 Act as insulators among the neurons (Insulator).

3-Nourish the neurons (Nutritive).

4-Have a role in repairing the injured parts of some neurons (Compensator, because they can divide).

5-Connect the nerve fibers (axons with surrounding sheaths) together to form the nerve bundle which form the nerve (Connective).

Nerve:-

Nerve consists of:

- A **group of nerve bundles:**

Each nerve bundle is formed of a group of nerve Fibers (axons with surrounding sheaths) and Connected by supporting neuroglia (glial cells).

- **Bundle sheath:**

It is a connective tissue that surrounds each nerve Bundle.

- **Nerve sheath (Epineurium) :**

It is a connective tissue that surrounds the whole Nerve (groups of nerve bundles) and contains Blood vessels.

Work sheet

1-Which of the following is considered the functional unit of the nervous system?

(a) Nerve cell. (b) Schwann cell.

(c)Glial cell. (d) Nerve.

2-- Which of the following statements is correct?

(a) The nerve cell is surrounded by one Schwann cell.

(b) Schwann cell is surrounded by one nerve cell.

(c) The nerve cell is surrounded by more than one Schwann cell.

(d) Schwann cell is surrounded by more than one nerve cell.

3 - Which of the following represents the part of the nerve cell which transmits the nerve impulse away from the cell body?

(a) Schwann cell. (b) Terminal arborization.

(c) Dendrite. (d) Synaptic knob.

4- Which of the following their presence is associated with receiving the nerve impulses in The nerve cell?

(1) The cell body and terminal arborizations.

(2)The cell body and dendrites.

(3) The dendrites and terminal arborizations.

(4)The cell axon and terminal arborizations.

5-What are the cells that transmit the nerve impulse from the peripheral nervous system to The central nervous system?

(a) Sensory neurons.

(b) Connector neurons.

(c) Motor neurons.

(d) Neuroglia.

6-The nerve cells link between certain body parts, which of the following the sensory nerve cells can link between them?

(a) The brain with muscles.

(b) The sense organs with muscles.

(c) The sense organs with brain.

(d)sense organ with another sense organ.

7- During the dissection of a human body, a structure in the nervous system whose length is More than 95 cm was found, which of the following may represent this extension?

(a) A nerve cell body.

(b) An axon of nerve cell.

(c) A dendrite of nerve cell.

(d) Glial cell.

8- Which of the following is correct about neuroglia?

(a)They represent a type of nerve cells.

(b) They transmit the nerve impulse.

(c) They are considered from the components of nervous tissue.

(d) They have no ability to divide.

9- What does the nerve represent?

(a) A dendrite of a neuron.

(b) A group of coated nerve fibers.

(c) Uncoated cylindrical axons.

(d) Group of nerve cell bodies.

10- When a person exerts a muscular effort, the heartbeats rate, respiration rate and Secretion increase. Which of the following systems regulates the actions between. Previous organs in human body?

(a) Circulatory. (b)Nervous.

(c) Excretory. (d) Respiration

11- Compare between: sensory neurons and motor neurons.

12- "The different types of nerve cells transmit different types of nerve impulses": How far is this statement correct? With explanation.

13- What happens in case of: the absence of neuroglia from the components of the nervous Tissue?

14-Give reason for: on the occurrence of an injury in the nervous centres,, the wound cat Healed, although the neurons are unable to divide.

15-Compare between: nerve cells and neuroglia, "according to: function

Nerve Impulse

- **Nerve impulse**-:

It is the message that is transmitted through the nerves from the sense organs (receptors) to the central nervous system (brain and spinal cord), and from it to the effector (responding organs (muscles and glands).

- **Nature of the nerve impulse**

The nature of the nerve impulse transmission 1S an electrical phenomenon with chemical Nature (electrochemical phenomenon), to understand the nature of the nerve impulse And its transmission in the nerve fiber. We have to study the nerve cell and the changes that occur to it during the following four states:

First :The nerve cell at rest.
Second: The changes that occur when stimulating the nerve cell.
Third: The propagation of the nerve impulse through nerve fibers.
Fourth the return of nerve cell to its original state.

Nerve cell at rest:-

On studying the ions concentration inside and outside the nerve cell, it was found that there is a clear difference in the distribution and concentration of these ions, where:

- The concentration of sodium ions (Na") outside the cell is about 10: 15 times high than their concentration inside the cell.
- The concentration of potassium ions (K) inside the cell is about 30 times higher than
- Their concentration in the external fluid that surrounds the cell.

The concentration of negative ions inside the cell is much higher than their concentration outside, due to the presence of chloride ions (CI) and negatively charged protein molecules.

- The amount of negative ions that are present inside the nerve cell is equivalent to all positive ions and exceeds them.

  So, the inner surface of the cell is **negatively charged.**

The amount of positive ions that are present outside the nerve cell is equivalent to All negative ions and exceeds them. So, the outer surface of the cell is Positively charged.

- The unequal distribution of ions outside and inside the nerve cell results in the presence of an electrical potential difference that is called"resting potential" and equals (-70 millivolt (mV), resulting in the'polarization state".

Polarization state
It is the nerve cell state at rest, when its outer surface is positively charged and its inner surface is negatively charged.

• **The reasons for the occurrence of polarization state in the nerve cell:**

1-The unequal selective permeability for sodium and potassium ions:

- The nerve cell membrane during rest is 40 times permeable to potassium

Ions (K) (which diffuse from inside to outside) than its permeability to sodium

Ions (Na) (which diffuse from outside to inside).

2- The accumulation of ionized proteins with high molecular weight:

They are negatively charged on the inner surface of the nerve cell membrane.

In addition to chloride ions (Cl).

-3 Sodium-potassium pumps that are present in the fiber membrane:
-They play a role in maintaining the relative ionic distribution on two sides' fiber membrane by active transport, till the occurrence of stimulation and passage
Of nerve impulse.

- The accumulation of positive potassium ions outside the membrane, leaving the negative proteins (which can't pass through the membrane, due to their large size while chloride (CI) ions are in its inner side. So, the cell potential difference at rest reaches (-70 mV).

Second state
The changes that occur when stimulating the nerve cell.

-1The nerve cell is stimulated only, when the stimulus is sufficient for stimulating
2 There are changes that occur in the permeability of cell membrane to ions, leading to :
- The inflow of large amounts of sodium ions (Na) to inside the cell.
-The outflow of small amounts of potassium ions (K^+) to outside the cell.
This occurs through special channels or paths in the cell membrane, where the amount of positive charges that enter the cell is enough to neutralize the negative ions inside it.

- The outer surface becomes negatively charged comparing with its inside, and this is the reverse to the resting state.

3-A the membrane potential difference becomes about (+40 mV), and this new state is called "depolarization state",

- **Depolarization**

It is the nerve cell state on stimulation, when its outer surface is negatively charged and its inner surface is positively charged.

Third state

The propagation of the nerve impulse through nerve fibers

1-The depolarization causes the stimulation of the neighboring point of the nerve fiber membrane which leads to the occurrence of the same previous changes that occur on stimulating the nerve cell at the first time.

2-The nerve impulse propagated along the nerve fiber in the form of waves of depolarization, polarization and then depolarization again and so on.

Fourth state: The return of nerve cell to its original state (Repolarization)

• As soon as the stimulus effect vanishes, changes occur in the nerve fiber membrane, as follows:

1- The nerve fiber membrane becomes permeable again to potassium ions and impermeable to sodium ions.

2- The nerve fiber membrane returns to its previous permeability before stimulation (at rest).

3- The unequal distribution of ions on the two sides of the membrane returns to its original (resting) state, i.e. it returns to the polarization state

4-The occurrence of refractory period in which the membrane of nerve cell restores its physiological properties to be ready to respond to a new
Stimulus and transmit another nerve impulse.

Refractory period:-

It is a short period of time (0.001: 0.003 of second) following the nerve in
Which the nerve cell membrane restores its physiological properties
selective permeability) "through Na- K pump" to be ready for responding to a new stimulus and transmitting another nerve impulse, and during this period the nerve cell will not respond to any stimulus whatever its strength.

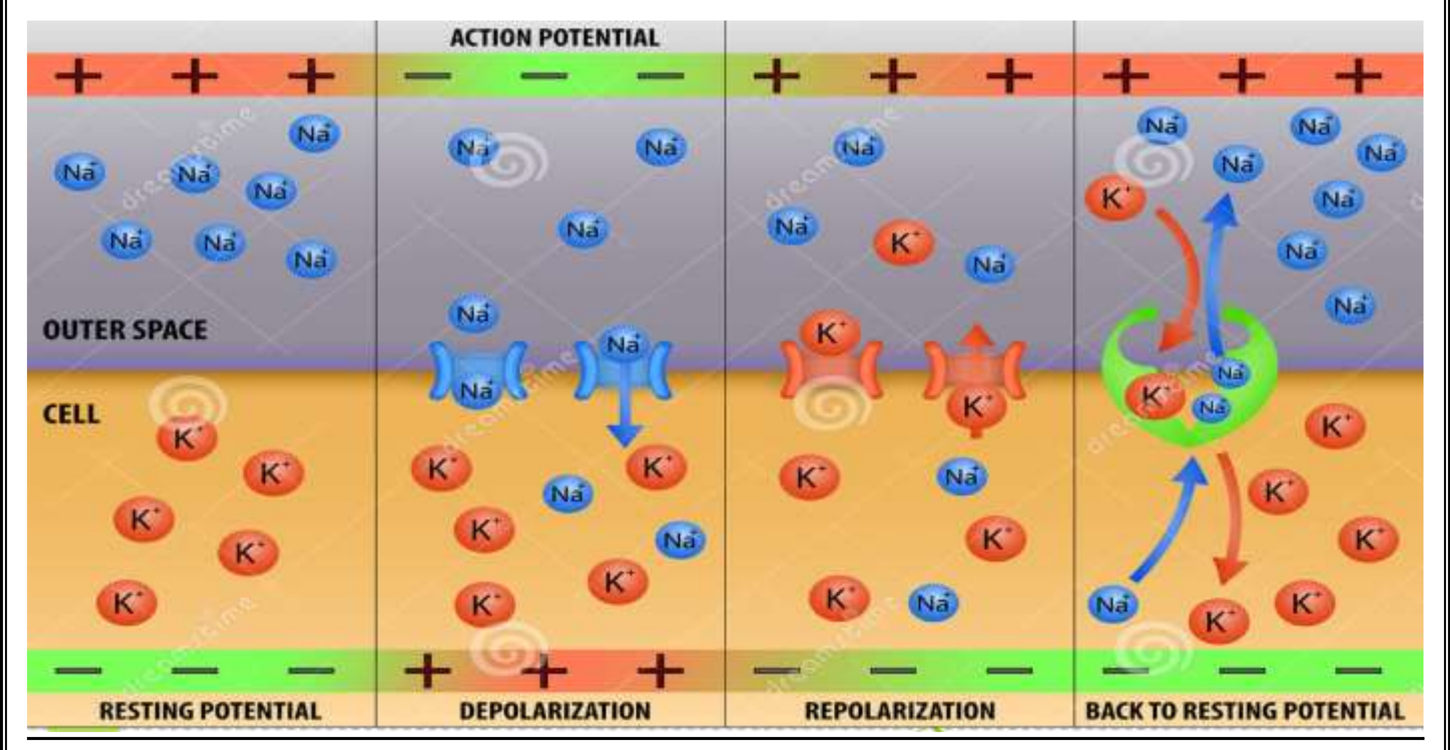
5-The response of nerve cell to the stimulus is called the "action potential" which
Includes a state of depolarization followed by repolarization, and it equals (110 mv)

- Action potential

It is a phenomenon of depolarization (from -70 mV to + 40 mV), and it equals (110 mv)

- Note

The rapid propagation of the action potential along the nerve fiber is in fact
the nerve impulse or stimulus.



<u>**Properties of the nerve impulse**</u>

<u>**1 -Speed of the nerve impulse**</u>

• The speed of the nerve impulse propagation from place to another along the nerve fiber Depends on the diameter of the nerve fiber, as :

- the speed of nerve impulse propagation reaches about 140 m/s in thick (myelinated) nerve fibers of large diameter.
- The speed of nerve impulse propagation reaches about 12 m/s in thin (non-myelinated) nerve fibers of small diameter.

<u>**2 All or None law**</u>

• The stimulation of nerve and muscles contraction obey the “All or None"

All or None law

- The nerve impulse will not be generated, unless the stimulus is strong enough to stimulate Law. The nerve with a maximal strength, i.e. the sufficient stimulus produces maximum Response.

- Any increase in the stimulus strength will not increase the response strength.

- The weak stimulus is insufficient to change the nerve cell (or nerve fiber) from the rest State (-70 mV) to the action potential (110 mV), i.e. it can't produce an action potential (Nerve impulse)

- <u>**Synapse**</u>

It is the site that is present between the terminal branches (Arborizations) of the axon of one Neuron and the dendrites of the next neuron.

- **Types of synapse**

1- Synapse between two neurons.
2 -Synapse between neuron and muscle fiber.
3-Synapse between neuron and glandular cells. Button

- **Structure of the synapse**

• The ultrastructure of synapse reveals that the synapse consists of:

1- Buttons (Synaptic knobs)

They are swellings that are present at the end of the terminal arborizations of a nerve cell Axon and located very close to the dendrites (or cell body) of the next neuron.

2- Synaptic (Nervous) vesicles

They are small sacs that are present inside the buttons and filled with chemical Transmitters (neurotransmitters), such as acetylcholine and noradrenaline (neurotransmitter hormone) which play an important role in the transmission of the nerve impulse from a neuron to the next one through the synapse.

3 -Synaptic cleft

It is a narrow space that is present between the buttons and dendrites of the next neuron, And separates the presynaptic membrane (terminal arborizations) from the postsynaptic Membrane (dendrites).

Mechanism of transmitting the nerve impulse across the synapse

•The study of the synapse is important in explaining how the nerve impulse Is transmitted from a nerve cell to another, as follows:

1-The arrival of a nerve impulse to the buttons "synaptic knobs" leads to The entry calcium ions inside the cell by the action of calcium pump that is present in Nerve cell membrane.

2-The inflow of calcium ions leads to the rupture of a large number of synaptic vesicles and The release of neurotransmitters from them.

3-The neurotransmitters cross the synaptic cleft and reach the membrane of dendrites Of the next neuron.

4-The neurotransmitters bind to their special receptors that are present on the membrane Of .dendrites, leading to the stimulation of these points and changing the permeability of the membrane to sodium (Na) and potassium (K") ions.

5- This results in depolarization and production of an action potential (nerve impulse) which Propagated from the nerve cell body to its axon, then to the next neuron and so on.

6-After performing its function, acetylcholine (neurotransmitter) is destroyed under The effect of an enzyme called cholinesterase to terminate its action. Therefore. The postsynaptic membrane returns to the resting (polarization) state again

Work sheet

1-Which of the following is related to the resting potential?

(a) Action potential. (b) The outflow of potassium ions from the cell.

(c) The equal distribution of ions. (d) The isolation by Schwann cells.

2- Which of the following ions the increase in its permeability causes the return of Potential difference in the nerve cell to (-70 mV) after the stimulation?

(a) Na (b) K+

©Ca+ (d)Cl-

3-which of the following states takes place when the potential difference reaches (-80 mV) on the two sides of the nerve fiber membrane ?

(a)Depolarization. (b) Action potential.

(c) Increasing polarization. (d) Resting potential.

4- Which of the following the speed of nerve impulse transmission doesn't depend on it ?

(a)The presence of myelin sheaths. (b) The diameter of nerve fiber.

(c) The presence of acetylcholine. (d) The increase of the stimulus strength.

5- What happens when binding the acetylcholine compounds with their specific receptor on the membranes of dendrites

(a) The inflow of sodium ions through their channels to the postsynaptic membrane.

(b) The inflow of potassium ions through their channels to the postsynaptic membrane:

(c)The inflow of potassium ions through their channels to the presynaptic membrane

(d) The inflow of sodium ions through their channels to the presynaptic membrane

6- Which of the following is caused by acetylcholine?

(a) The formation of electrical potential difference of the nerve cell at rest state

(b) The transmission of nerve impulse through the synaptic regions.

(c) The increase of polarization of the nerve cell.

(d) The increase in the permeability of postsynaptic membrane to sodium and potassium

7- Which of the following is needed by the nerve fiber membrane during the refectory

Period to restore its physiological properties?

(a) Calcium ions. (b) Cholinesterase.

(c) Acetylcholine. (d) ATP

8- Which of the following changes the potential difference on the two sides of nerve fiber

Membrane after stimulation to reach (+40 mV) ?

(a) The inflow of Na ions.

(b)The inflow of K* ions.

(c)The inflow of K* ions and the outflow of Na ions.

(d)The outflow of K* and Nat ions.

9-"When the nerve fiber is stimulated by a certain stimulus, a group of changes occurs to it which lead to the occurrence of depolarization state to the nerve fiber":

(a) Explain how the depolarization of nerve fiber occurs.

(b) How does the nerve cell or nerve fiber return to its original state at rest (polarization)?

10-Compare between: calcium pump and sodium-potassium pump in the nervous tissue,

"According to: the function – the effect of its action".

11- Explain how: the electrical potential difference of the nerve cell is formed at the rest state.

12- What happens in case of: vanishing the stimulus that affects the nerve cell?

What happens in case of: the absence of synaptic vesicles from the buttons?

(Synaptic knobs)?

13Explain: the ability of nerve impulse to transmit across the synaptic cleft.

Central Nervous System

- **Structure of the nervous system**

1-Central nervous system

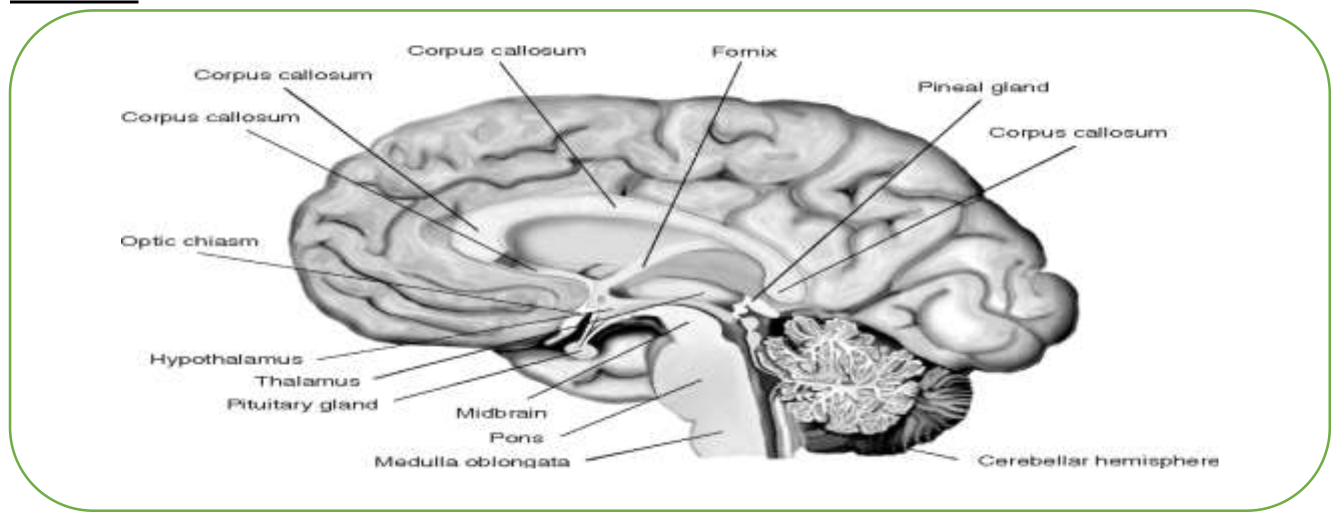
A-Brain B- Spinal cord

Peripheral nervous system

A-Spinal nerves B- Cranial nerves

First: Central nervous system

1 –Brain



•It forms the largest part of central nervous system, where its weight reaches about

- 350 grams at birth.

- 1400 grams in the adult man.

• It occupies (exists inside) a strong bony space Called the brain case or the (cranium)

• It is surrounded by three membranes called "meninges" which are responsible for the Protection and nourishment of the brain cells.

•These membranes are:

1- The dura mater: it is a membrane which lines the skull bones.

2 The pia mater: it is a membrane which adheres to the brain surface.

3 The arachnoid: it is a membrane which fills the space between the other two membranes (Outer dura and inner pia), and contains a transparent fluid to protect the brain from the mechanical trauma.

The main components of brain

A-Forebrain

1-Cerebral cortex (Tw cerebral hemispheres)

2-Thalamus

3-Hypothalamus

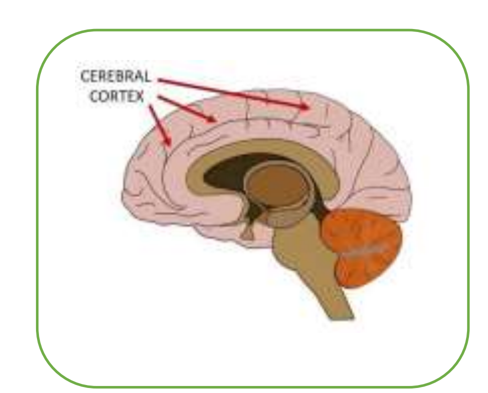
B-Midbrain

C-Hindbrain

1-Cerebellum

2-Pons Varolii

3-Medulla oblongata



A –Forebrain

1-cerebral cortex

It represents the largest part of the brain, and it consists of:

- Two big lobes, where each lobe of them is called "cerebral hemisphere and they are separated by a big fissure, but connected together by a big bundles of nerve
- The cerebral cortex is characterized by the presence of depression of different depths called "fissures and grooves", and between them there are folds.
- Each cerebral hemisphere is divided into five lobes, which are :

1-Frontal lobe.

2- Parietal lobe.

3- Occipital lobe.

4-Temporal lobe.

-5 The 5th lobe which is not seen from the external shape, because it is covered by the frontal and parietal lobes.

• Functions of cerebral cortex:

- **Frontal lobe**: contains centers of voluntary movements (motor

Centers) and some centers of speech and memory.

- Parietal lobe: controls many sensory functions, such as sensation

Of heat, cold, pressure and touch (somatic sensations of skin).

- **Occipital lobe**: contains sensitive centers that control the sight sense

- **Temporal lobe**: contains centers of smell, taste and hearing sense

2-thalamus

•Function:

It is an important center for the coordination of sensory nerve impulses that reach the cerebral cortex (except the smell).

3-Hypothalamus

• Function:

It contains many centers that control the reflex actions, such as centers of :

- Hunger. -Thirst.
- Satiety. - Sleep.

-Body temperature regulation.

B- Midbrain

•It is considered the smallest part of brain.

•It represents a connective link between

the forebrain and hindbrain.

•Function:

- It contains nervous centers that keep the body balance (equilibrium).
- It contains centers that are connected with hearing and vision.

-It regulates many reflexes, such as those that related to hearing.

C- Hindbrain

• It consists of:

1. **cerebellum**

• It exists in the posterior region and consists of three lobes.

• Function:

It keeps the body balance (equilibrium) with the help

Of the inner ear and bod muscles.

2. **Pons Varolii**

• Functions:

- Each of Pons Varolii and medulla oblongata works on the transmission of nerve impulses from the spinal cord to the different parts of brain.

3- Medulla oblongata

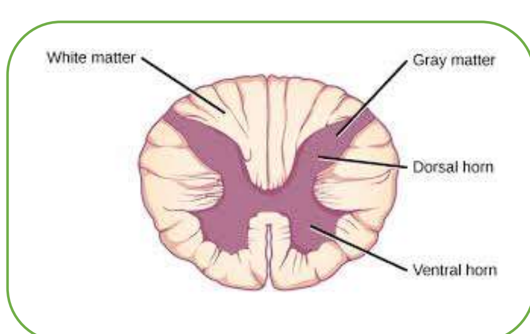
- Medulla oblongata contains some vital centres in the body.

the most important ones are

• Respiratory centres.

• Blood vessels movement regulatory centres.

• Swallowing, vomiting, sneezing and cough centres.



2- Spinal cord

•It exists inside a canal that is present inside the vertebral column (vertebrae) and called the "neural canal" or "spinal canal".

•It starts from the medulla oblongata of brain and extends along the vertebral column.

• Its length reaches about 45 cm long in the adult man.

•is hollow from inside, because it contains a small canal called "central canal"

•There are two fissures (dorsal and ventral) that extend along the midline and divide the spinal cord incompletely into two halves.

• It is covered by three membranes (meninges), which are from outside to inside, as follows

- Dura mater **-Arachnoid.** **Pia mater.**

Structure of the spinal cord: its tissue consists of two layers:

Inner layer	Outer layer
•It is the grey matter which looks like (H) letter (i.e. it is H-shaped). •It is formed of nerve cells' bodies, dendrites and neuroglia (glial cells). •Its function: it is considered the main center of reflex actions, where the spinal cord contains thousands of reflex arcs. •It has two dorsal and two ventral horns	• It is the white matter. • It is formed of nerve fibers. • Its function: it acts as a transmitter for the nerve impulses from all different body parts to the main centres in brain and vice Versa.

- **The nervous system region that mostly contains fatty substances is the white matter, because it is formed of nerve fibers which contain the myelin substance that is considered a fatty substance.**

Work sheet

1- Where is Pons Varolii located?

(a) Behind the cerebellum and beneath the medulla oblongata.

(b) In front of the cerebellum and above the medulla oblongata.

(c)Beneath the midbrain and in front of the pituitary gland.

(d)Above the midbrain and behind the pituitary gland.

2- Where are the centres of the higher functions in the brain present?

(a) Medulla oblongata. (b)Cerebellum.

(c) Spinal cord. (d)Two hemispheres.

3- Which of the following nervous system's parts receive(s) the nerve impulse of the light Stimulus?

(a)Cerebellum. (b) Spinal cord.

(c) Two cerebral hemispheres. (d)Hypothalamus.

4-What happens when the medulla oblongata is injured by a severe damage?

(a) General paralysis occurs. (b) Losing the sense of sight.

(c) Losing the ability to speak. (d)Death occurs.

5- Which of the following isn't considered a similarity between brain and spinal cord?

(a)Each of them is protected by bony tissues.

(b) Each of them is surrounded by the same meninges.

(c)The nerve impulse of the reflex actions reaches both of them at the same time.

(d) Each of them is divided into two regions.

6- which of the following cooperate together to make the body adapt with the change in the surrounding temperature

(a) Parietal lobe and hypothalamus. (b) Occipital lobe and hypothalamus

(c) Parietal lobe and thalamus. (d) Temporal lobe and hypothalamus

7-Which of the following is connected with the pituitary gland?

(a) Hypothalamus. (b)Midbrain.

(c) Thalamus. (d) Pons Varoli.

8-What is the part which isn't affected when a person is subjected to high sound waves? During a scientific lecture?

(a) Cerebral cortex. (b)Thalamus.

© Cerebellum (d) Midbrain.

19-What is the difference between: the frontal lobe and occipital lobe of the brain?

10- What happens in case of: anesthetization of the hypothalamus region of brain?

11-Compare between: forebrain and hindbrain, "according to: structure - function".

حمل الآن

مجانا وحصريا

المراجعة رقم (3)

اختبار شهر مارس



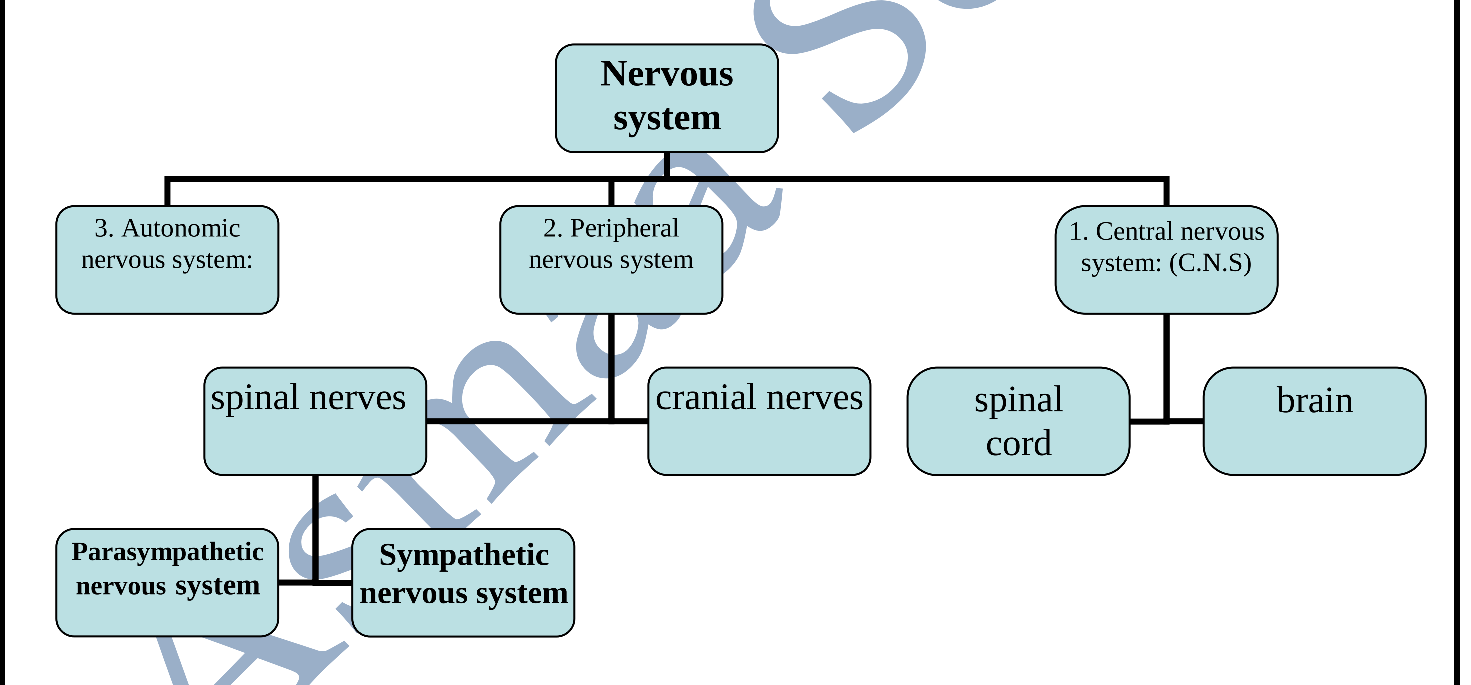


2-Nervous System & Sensation in Man

Nervous system

1- Controls all functions of human body systems,
2-Receives information in the form of external and internal stimuli through receptor systems and gives the proper response. **To**:-
a-keep the human body in a continuous direct communication with his external and internal environment.
b-help, with the endocrine glands to keep the internal condition of the body in an ideal, constant and balanced state (homeostasis).

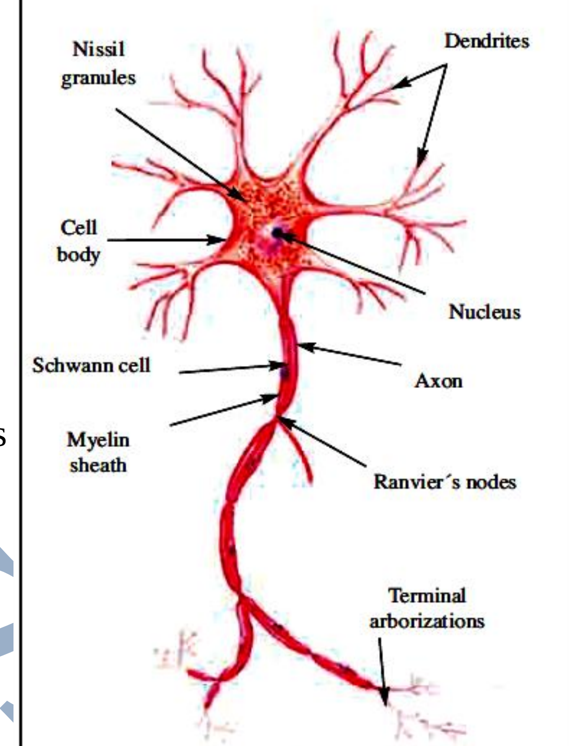
➲The nervous system is highly developed in vertebrates, especially in man.



➡**Autonomic nervous system**:
Includes the nerves that control the involuntary muscles and the glands.
➡**Note:-**
1. Sympathetic nervous system:
The nerve fibres of this system originate from the thoracic and lumbar regions (segments) of the spinal cord.
2. Parasympathetic nervous system:
The nerve fibres of this system originate from the brain and the sacral region of the spinal cord.

The Nerve Cell (Neuron)

- The unit of structure of the nervous system
- The nerve cell is small in size and cannot be recognized by the naked eye.
- It consists of :



Nerve cell

A) Cell body:

It contains

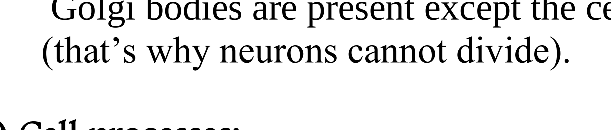
1-rounded nucleus

2-cytoplasm known as "neuroplasm". It contains

↪neurofilaments

↪Nissil granules (which are unique for nerve cells). They are considered as a stored food for the cell.

↪All cell organelles as mitochondria and Golgi bodies are present except the centrioles (that's why neurons cannot divide).



B) Cell processes:

1- Dendrites:

Many short processes which increase the surface area available to receive nerve impulses and through which all nerve impulses enter to the cell.

2- Axon:

►It is a long cytoplasmic extension of the cell (may reach more than a metre in length) and usually known as the ***"nerve fibre"***.

-In some cells the axon is surrounded by a sheath of lipid called ***"myelin sheath"*** secreted by special cells called Schwann cells.

-The outer cover of the axon ***"nerve fibre"*** is the ***"neurolemma"***.

-The myelin sheath is not continuous around the axon but is interrupted at certain points by ***"Raniver's nodes"***.

-The axon ends in a group of branches called ***"terminal arborizations"***.

➡Note:-

✱The conduction of nerve impulses in myelinated axons (covered by myelin sheath) are much more rapid than in nonmyelinated nerve fibres (axons) because the myelin sheath is an insulator.

✱Normally, the nerve impulse is propagated and conducted through the nerve cell in one direction only:-

a-from the dendrite to the nerve cell body to the axon

b- then to another next neuron "nerve cells" through a synapse.

Types of Nerve cells:

● According to the function, nerve cells are classified into three types:

A- Sensory neurons	B- Motor neurons	C- Connector (intermediate) neurons
Convey (transmit) impulses from receptors to the central nervous system.	Convey impulses from the central nervous system to the effector organ as muscles and glands.	Relay impulses from sensory to motor neurons.

Neuroglia

● Another type of cells in the nervous system, have the ability to divide

● It performs the following functions:

1. Act as a connective tissue to support neurons.
2. Act as insulators between neurons.
3. Nutrition of neurons.
4. Have a role in repair of injured parts of some neurons.

artery (A) vein (B)

Neuroglia

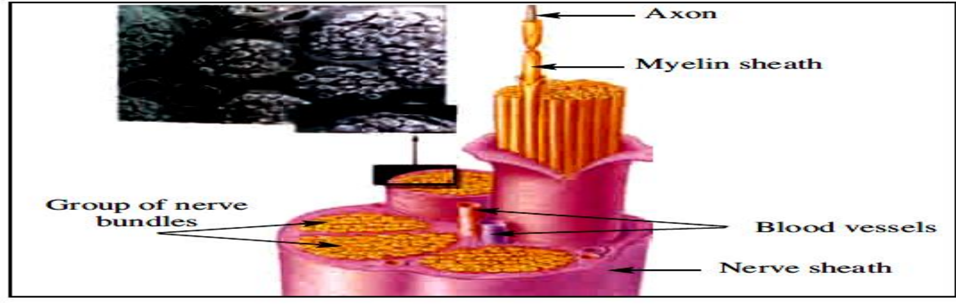
Structure of the Nerve

► **Nerve fiber** : A group of axons

► **Nerve bundles:** is formed of a group of nerve fibres (axons) and connected by supporting neuroglia cells (glial cells).

► **The nerve** : consists of a group of nerve bundles, each of which is surrounded by a connective tissue sheath.

► **Epineurium** :The whole nerve is surrounded by another connective tissue called epineurium which contains blood vessels.



Structure of a Nerve

The Nerve Impulse

The nerve impulse:-
It is the message transmitted through the nerves from sense organs (receptors) to the central nervous system and from the latter to the effector (responding) organs.

The nature of the nerve impulse:-
The nerve impulse is an electrical phenomenon with a chemical nature (electrochemical phenomenon).

The transmission of nerve impulse:-
To understand the nature of the nerve impulse and its transmission, we have to study the nerve cells "neuron" during four different conditions:

1- The nerve cell at rest :-
●It is called the resting potential.
●At rest, there is a difference in distribution & concentration of ions outside and inside the nerve cell, as follows:

Porlarized membrane
Propagation of nerve impulse along nerve fiber

➥The concentration of sodium ions (Na+) outside the cell is 10 to 15 times higher than inside.
➥The concentration of potassium ions (k+) inside the cell is 30 times higher than outside.
➥The concentration of negative ions as chloride (C1-) and protein ions are higher inside the cell.
➥The amount of negative ions inside the cell exceeds the positive ions.

Potential difference (resting potential:-)
It is the electrical potential difference resulting from the unequal distribution of ions between outside and inside the cell surface equals - 70 millivolt (mV).

Polarization:-
It is the electric state of the membrane of the nerve cell during resting condition in which its outer surface is positive & its inner surface is negative is(polarized)

This state of polarization is a result of:-
1- The selective permeability of the resting membrane:
The membrane of the nerve cell is 40 times permeable for potassium ions (which diffuse from inside to outside) than for sodium ions (which diffuse from outside to inside). This results in accumulation of excess positive charges on the outer surface of the membrane.
2- Accumulation of high molecular weight protein ions in addition to chloride Ions:
which are negatively charged on the inner side of the membrane.
3- Sodium- potassium pump:
which plays a role in maintaining this ionic distribution.

➡Therefore, at rest there is accumulation of positive potassium ions outside and negative protein and chloride ions inside the membrane.

2- Changes in the nerve cell on stimulation:-

●The nerve cell is stimulated only when the stimulus is sufficient (strong enough).

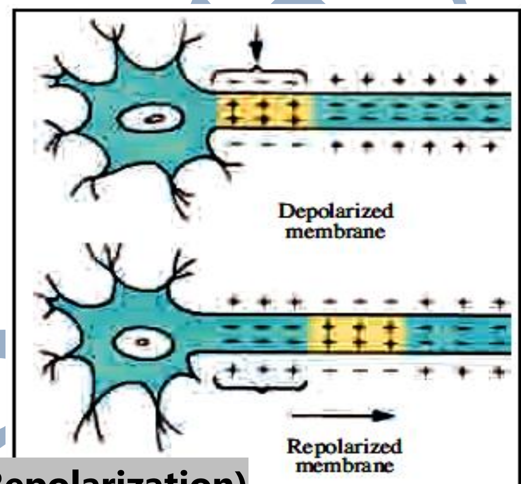
1-There are changes in the permeability of the membrane in which the inflow of the positively charged sodium ions exceeds the outflow of potassium ions through special channels in the membrane

2-This leads to accumulation of excess positive charges inside the membrane, i.e.reverse the original polarity

3-The membrane potential becomes + 40 mV. This new state is called depolarization.

3- Propagation of nerve impulse through the nerve fibres:-

The depolarized (stimulated) point acts as a stimulus for the neighbouring points which when stimulated undergo the same previously mentioned changes as the first one and the process is repeated along the nerve fibre.



4- The nerve cell returns to its original state: (Repolarization)

1- After the end of depolarization the membrane becomes again permeable to potassium ions and impermeable to sodium ions.

2- Continuous outflow of potassium ions leads again to accumulation of excess positive ions outside the membrane and the membrane is said to be "repolarized", i.e. returns to the resting state again (-70 mV).

Action potential:-

It is the response of the nerve cell to the stimulus which includes a state of depolarization followed by repolarization (110 mV).

The nerve impulse:-

It is the propagation of the action potential along the nerve cell (fibre).

The refractory period:-

It is the period in which the nerve cell will not respond to any stimulus what ever its strength & it ranges between 0.001 to 0.003 second following stimulation,

3-During the refractory period the membrane of the nerve cell regains its physiological properties to be ready to respond to new stimulus and to transmit another nerve impulse.

↳Properties of the nerve impulse:

1- The speed of propagation of the nerve impulse along a nerve fibre depends on its diameter

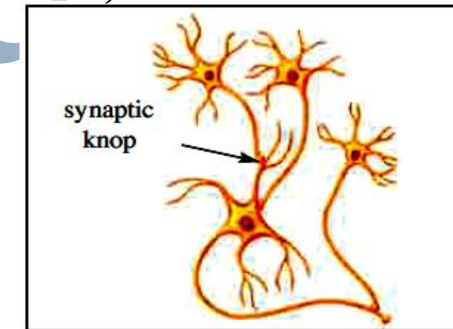
- where it reaches 140 meters/second in thick (myelinated) nerve fibres
- while the speed is 12 meters/second in thin (non myelinated) nerve fibres.

2- Stimulation of the nerve "and muscle" obeys "the all or none law" which means that

- The nerve responds maximumly or does not respond at all; in other words the sufficient stimulus produces a maximum response (generation of nerve impulse) and any increase in the strength of the stimulus will not increase the response.
- Weak stimuli are insufficient to produce an action potential (nerve impulse).

The synapse

The synapse is the site between the terminal branches (arborizations) of the axon of one neuron and the dendrites of the next.



Synapse between Neurons

➲Types of synapses:

a) Synapse between two neurons.
b) Synapse between a neuron and a muscle fibre.
c) Synapse between a neuron and gland cells.

➲Structure of the synapse:

The ultrastructure of the synapse reveals that

Buttons (synaptic knob): the terminal branches of the axon end with swellings called buttons which are very close to the dendrite of the next neuron.

synaptic vesicles: The synaptic button contains a small vesicles (sacs) called synaptic vesicles, filled with chemical transmitters as ***"acetylcholine"*** and ***"noradrenaline"*** which play an important role in synaptic transmission of the nerve impulse from one neuron to the next.

synaptic cleft: In between, there is a very narrow space called the synaptic cleft. This cleft separates a presynaptic membrane (axon) from a postsynaptic membrane (dendrite).

➲Mechanism of transmitting a nerve impulse across a synapse:

1-Arrival of a nerve impulse to the buttons leads to entrance of calcium ions by the action of a ***calcium pump*** in the cell membrane.

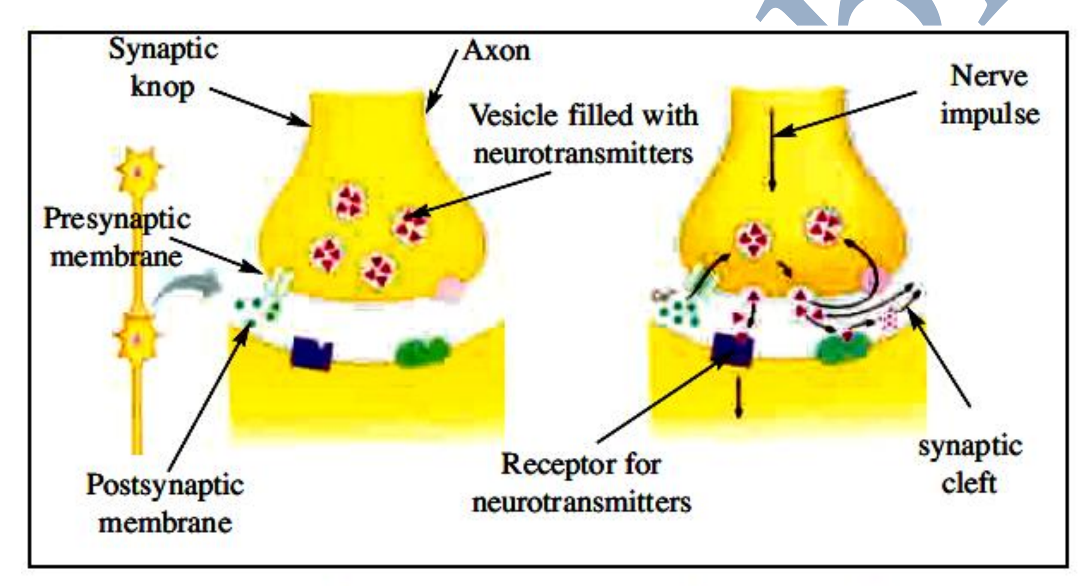
The inflow of calcium ions leads to rupture of the synaptic vesicles and the release of the chemical transmitters.

2-The chemical transmitters cross the synaptic cleft and reach the membrane of the dendrites of the next neurons.

3- Binding of the chemical transmitters to special receptors on the membrane of the dendrites leads to stimulation of theses points and changes the permeability of the membrane to sodium and potassium ions. These results in depolarization and reduction of an action potential (nerve impulse) as previously mentioned.

4-This nerve Impulse is propagated through the cell body then to the axon of the neuron then to a next synapse and so on.

5-After performing its function, acetylcholine (chemical transmitter) is destroyed under the effect of an enzyme called cholinesterase to terminate its action. After that, the postsynaptic membrane (dendrite) returns to the resting state again.



Synaptic transmission of nerve impulse

The Central Nervous System (C.N.S)

A) The brain:

-The brain constitutes the major part of the central nervous system, with a weight that ranges from 350 grams at birth, and reaches 1400 grams in adults.
-The brain occupies a bony space called the brain case or the cranium (a part of the skull).
-The brain is surrounded by three membranes called the meningies which are responsible for the protection and nutrition of the brain cells. These membranes are:

1. **The dura mater**:

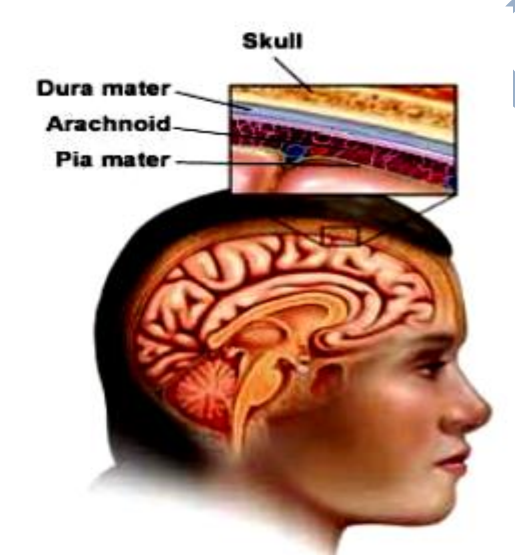
The membrane which lines the skull.

2. **The pia mater**:

The membrane which is in direct contact and adheres to the brain.

3. **The arachnoid**:

The membrane which is in between the other two membranes and contains a transparent fluid to protect the brain from mechanical trauma.



♦The brain consists of three main parts:

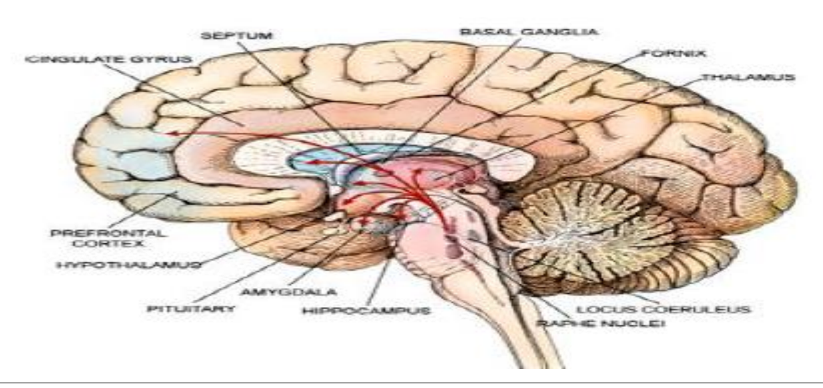
1. **Forebrain:**

It includes the two cerebral hemispheres (the brain cortex), thalamus, and hypothalamus.

2. **Midbrain.**
3. **Hindbrain:**

It includes the cerebellum, pons Varolii, and medulla oblongata.

12 pairs of cranial nerves originate from the brain



Ms.Asmaa Sobhy Mob.01063740616
https://www.facebook.com/Asmaa-Sobhy-107633591414496/

The structure and the function of each part of the brain:

1. Forebrain:

a. Two cerebral hemispheres (the cerebral cortex):

-Two big lobes separated by a big fissure and attached to each other through a big bundle of nerve fibres.
-Each lobe is called a cerebral hemisphere.
-The cortex of each lobe (the cerebral cortex) is characterized by the presence of depressions of different depths called fissures and grooves, and in between there are folds.
-Each cerebral hemisphere is divided into many lobes.

Parietal lobe
Frontal lobe
Occipital lobe
Temporal lobe

These lobes are:

1. Frontal lobe.
2. Parietal lobe.
3. Temporal lobe.
4. Occipital lobe.

In addition, there is a 5th. Lobe covered by the frontal and parietal lobes

The functions of the cerebral cortex:

a. The frontal lobe contains centres of voluntary movements (motor centres), centre of memory and speech.

b. The parietal lobe controls many sensory functions and contains centres of sensation of heat, cold, pressure, and touch (somatic sensations from the skin)

c. The occipital lobe contains centres of vision.

d. The temporal lobe contains centres of smell and also centers of speech.

b. Thalamus:

Thalamus is an important centre for coordination of different sensations (except the smell).

c. Hypothalamus:

Hypothalamus controls different reflexes and contains centres of hunger, satiety, thirst, and body temperature regulation, in addition to centre of sleep.

2. Midbrain:

The smallest part of the brain, and represents a connection between the forebrain and the hindbrain, and contains centres of equilibrium and centres related to hearing and vision.
In addition, it regulates many reflexes as those related to hearing.

3. Hindbrain: It consists of:

a. Cerebellum:

That is situated in the posterior region and consists of three lobes. The main function is to keep balance and equilibrium of the body in association with the inner ear and muscles.

b. Pons Varolii and medulla oblongata:

That performs the following functions:
1. Transmission of nerve impulses between the spinal cord and different brain regions.
2. The medulla oblongata contains vital centres as those of respiration, swallowing, vomiting, cough, sneezing, and blood vessels.

B) The spinal cord:

-The spinal cord exists inside a canal in the vertebral column called **the neural canal.**
-It extends from the medulla oblongata in the form of a cylindrical cord about 45 cm long.
-The spinal cord is hollow containing a central canal and covered by meningies as those surrounding the brain (dura mater, pia mater, and arachnoid).
-Along the midline there are two fissures (dorsal, and ventral) which divide the spinal cord incompletely into two halves. The spinal cord consists of 2 layers; outer white matter formed of nerve fibers and inner grey matter formed of nerve cells with their dendrites and neuroglia.
-Gray matter is H-shaped with two dorsal horns and two ventral horns.

Functions of the spinal cord:

-The grey matter is the main center of reflex action as it contains thousands of reflex arcs.
-The white matter transmits impulses from different parts to the brain and vice versa.



Spinal nerves:

There **are 31 pairs** of spinal nerves that originate as successive pairs from both sides of the spinal cord as follows:

1. Eight pairs of cervical nerves.

2. Twelve pairs of thoracic nerves.

3. Five pairs of lumbar nerves.

4. Five pairs of sacral nerves.

5. One pair of coccigeal nerves.

Each spinal nerve originates from the spinal cord by two roots (dorsal, and ventral). The dorsal root carries sensory nerve fibers that transmit impulses from the receptors to the spinal cord and then to the brain. The ventral root carries motor nerve fibers that transmit impulses to the responding organs (effectors) as muscles and glands.



كيفية طباعة صفحات معينة من ملف معين



مثلا ازاى نطبع الصفحات من صفحة 4 الى صفحة 9

خطوة 1

خطوة 2
اختيار اسم الطابعة بتاعتك

خطوة 3
كتابة الصفحات المراد طباعتها
نكتب رقم 4 ثم نكتب الشرطة دي - ثم نكتب 9

خطوة 4
اختيار نوع الورق

خطوة 5
اختيار A4

خطوة 6